Energy Efficiency and Renewable Energy
Federal Energy Management Program

How to Buy an Energy-Efficient Gas Fryer

Why Agencies Should Buy Efficient Products

- *Executive Order 13123 and FAR part 23 direct agencies to purchase products in the upper 25% of energy efficiency, including all models that qualify for the EPA/DOE* ENERGY STAR® *product labeling program.*
- *Agencies that use these guidelines to buy efficient products can realize substantial operating cost savings and help prevent pollution.*
- *As the world's largest consumer, the federal government can help "pull" the entire U.S. market towards greater energy efficiency, while saving taxpayer dollars.*

Federal Supply Source:

- General Services Administration (GSA)
  General Products Center, Fort Worth TX
  Phone: (817) 978 - 4545
  www.fss.gsa.gov

For More Information:

- DOE's Federal Energy Management Program (FEMP) Help Desk and World Wide Web site have up-to-date information on energy-efficient federal procurement, including the latest versions of these recommendations.
  Phone: (800) 363-3732
  www.eren.doe.gov/femp/procurement
- The Food Service Technology Center (FSTC) has several fact sheets and other publications on food service equipment.
  (925) 866-2844
  www.fishnick.com
- The North American Association of Food Equipment Manufacturers (NAFEM) has information on standards, guidelines, and other publications on food service equipment.
  Phone: (312) 245-1054
  www.nafem.org
- American Society for Testing and Materials (ASTM) has test standards for food service equipment.
  Phone: (610) 832-9585
  www.astm.org
- Lawrence Berkeley National Laboratory provided supporting analysis for this recommendation.
  Phone: (202) 646-7950

Efficiency Recommendation[a]

Performance Metric	Recommended Level	Best Available
Cooking Energy Efficiency[b]	50% or more	65%
Idle Energy Rate	6,500 Btu/h or less	4,500 Btu/h

a) This efficiency recommendation covers 15-inch open deep fat fryers, which is the standard size for most floor and counter top model open fryers.

b) Based on the heavy-load efficiency test as prescribed by the *ASTM Standard Test Method for the Performance of Open Deep Fat Fryers (F1361).*

Definitions

Cooking energy efficiency is defined as the ratio of the energy absorbed by the food to the total energy input to the gas fryer.

Idle energy rate is amount of energy an appliance uses to maintain a stabilized operating temperature.

Where to Find Energy-Efficient Gas Fryers

The General Services Administration (GSA) is the federal supply source for gas fryers, which can be purchased through GSA's Schedule 539. Request GSA vendor price lists for models that meet this energy efficiency recommendation.

How to Select Energy-Efficient Gas Fryers

For gas fryers purchased through commercial sources (retailer, distributor, or contractor), specify a minimum cooking energy efficiency and idle energy use that meets or exceeds this efficiency recommendation. A high efficiency gas fryer costs more initially, but may have twice the production capacity as a standard gas fryer and use as little as half as much energy in a typical operation.

Choosing Test Method for Gas Fryers

Although a water-boil test has historically been used to determine fryer efficiency, it fails to accurately characterize fryer performance during cooking. A fryer's job is to maintain a vat of oil at a relatively high temperature while cooking food. During this time, the burners or elements may cycle off as the thermostat is satisfied. But during a water-boil test the frypot temperatures cannot exceed 212°F. Furthermore, the thermostat is never satisfied during this test and the duty-cycle of the elements or burners remains at 100%. Thus,

the ability of a water-boil efficiency test to reflect in-kitchen performance has been challenged by restaurant operators, and a new, standardized test method for the performance of fryers was developed (ASTM test method F1361). This new test method uses the more representative "french fry test" for cooking energy efficiency, along with a test for energy use in the idle ("ready") mode. Evaluating performance with real food allows both energy efficiency and productivity (production capacity) to be determined with the same test. Important performance characteristics such as recovery time can also be evaluated.

Technology Options

Manufacturers have responded to the needs of end-users with high production requirements by designing gas fryers that operate quickly and conveniently, as well as more efficiently. The improved designs have incorporated several energy-saving features. Infrared or powered burners offer a compact and efficient means for transferring heat to the frying oil. This provides a fast response time when food is placed in the fryer. Increased surface area on heat exchangers improves heat transfer to the oil, thus increasing energy efficiency. Solid-state thermostats are more sensitive, with a smaller bandwidth. They offer more precise temperature, responding quickly as a fryer is recovering to the thermostat set point. Many high efficiency fryers also come equipped with additional features such as cooking timers, cooking computers, built-in oil filtration system and basket auto-lift mechanisms. High-efficiency designs often come bundled with other features, such as all stainless-steel construction and high quality components. In addition to lower operating costs, high efficiency fryers exhibit higher production rates and shorter recovery times than base-model fryers, and in some cases can eliminate the need for an additional backup fryer to meet peak production needs.

User Tips

Implement an equipment start-up/shut-down schedule; most fryers take less than 15 minutes to preheat. Turning off unused fryers (e.g., backup fryers) during slow periods can save on energy costs throughout the year. Filter fryer oil at least once a day to extend the oil life. Don't overload fryer baskets beyond the recommended capacity. Overloading increases cook time and reduces product quality.

Gas Fryer Cost-Effectiveness Example (15-inch Open Deep Fat Fryer)

Performance	Base Model	Recommended Level	Best Available
Cooking Energy Efficiency	35%	50%	65%
Idle Energy Rate	14,000 Btu/h	6,500 Btu/h	4,500 Btu/h
Annual Energy Use	1,100 therms	735 therms	541 therms
Annual Energy Cost	$440	$290	$220
Lifetime Energy Cost	$3,650	$2,400	$1,830
Lifetime Energy Cost Savings	—	*$1,250*	*$1,820*

Using the Cost-Effectiveness Table

In the example above, a gas fryer with a cooking energy efficiency of 50% is cost-effective if its purchase price is no more than $1,250 above the price of the base model. The Best Available model, with a cooking energy efficiency of 65% is cost-effective if its price is no more than $1,820 above the price of the base model.

What if my Gas Price are different?

To calculate Lifetime Energy Cost Savings for a different gas price, multiply the savings by this ratio: $\left(\frac{\textit{Your price in ¢/therm}}{\textit{40 ¢/therm}}\right)$.

Cost-effectiveness Assumptions
Annual energy use was calculated based on preheat, idle, and cooking energy efficiency and production capacity test results from applying ASTM F1361. Annual energy use in this example is based on the fryer operating for 12 hours a day, 365 days per year, with one preheat daily and cooking 100 pounds/day of food. The assumed gas price is 40¢/therm, the federal average gas price in the U.S.

Lifetime Energy Cost *is the sum of the discounted value of annual energy costs based on an average usage and an assumed fryer life of 10 years. Future gas price trends and a discount rate of 3.2% are based on federal guidelines (effective from April, 2002 to March, 2003).*

Metric Conversions
1 therm = 100,000 Btu
= 29.3 kWh
*°F = (1.8 * °C) + 32*